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TRANSIENT STRAIN ACCUMULATION AND FAULT INTERACTION IN THE EASTERN CALIFORNIA SHEAR ZONE

PELTZER, G.(*,&), CRAMPE, F.(*,&), HENSLEY, S.(&), and ROSEN, P.(&), (*) Earth and Space Science Department, University of California, Los Angeles, CA90095, (&) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109

Satellite synthetic aperture radar interferometry reveals transient strain accumulation along the Blackwater-Little Lake fault system within the Eastern California Shear Zone. The surface strain map obtained by averaging eight years (1992-2000) of ERS radar data shows a 120 km-long, 20 km-wide zone of concentrated shear between the southern end of the 1872 Owens Valley earthquake surface break and the northern end of the 1992 Landers earthquake surface break. The observed shear zone is continuous through the Garlock fault, which does not show any evidence of left-lateral slip during the same time period. A dislocation model of the observed shear indicates right-lateral slip at 7±3 mm/yr on a vertical fault below the depth of ~5 km, a rate that is 2 to 3 times greater than the geologic rates estimated on north-west trending faults in the eastern Mojave. This transient slip rate observed in the 1992-2000 data and the absence of resolvable slip on the Garlock fault may be the manifestation of an oscillatory strain pattern between interacting, conjugate fault systems. Such a cycle provides a possible explanation for the observed clustering of large earthquakes in the ECSZ and on the Garlock fault. In this interpretation, the recent seismicity in the ECSZ (Owens Valley 1872, Landers 1992) may have been triggered by accelerated, localized strain accumulation within the shear zone in the last several hundred years as it is now observed along the Blackwater-Little Lake fault system.

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